**Executive Summary:**

**Short-Term SPY ETF Price Forecasting Project**

**Team: Algebros**

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The evolving dynamics of the investment landscape, led by the surge in zero-commission investing, has opened the doors for a considerable increase in the participation of retail traders. Among these new market participants, day traders have emerged as a significant group, placing an increased emphasis on short-term investment strategies.

The core objective of this data science project was to build a predictive model capable of forecasting the short-term high and low prices of the SPY ETF (S&P 500 ETF). To achieve this, we utilized a rich pool of historical price data and a variety of technical indicators.

Our primary goal was to create a robust and effective model to forecast high and low prices within a one-hour horizon. The model was designed to support investment decision-making, using the prices, trading volumes, and technical indicators from the past two hours as key input factors.

In our pursuit of this goal, we leveraged several well-established machine learning and statistical models. Our experimentation spanned a range of baseline models, including linear regression, ridge regression, and lasso regression. In addition to these baseline models, we also utilized more complex and sophisticated predictive algorithms such as Random Forest, Support Vector Regression (SVR), and Extreme Gradient Boosting (XGBoost).

Recognizing the potential advantages offered by models that can capture temporal dependencies in time-series data, we also incorporated Long Short-Term Memory (LSTM) networks into our predictive framework. Additionally, we explored the use of Hidden Markov Models (HMM) to model the prices as a sequence of observed variables, and the future price prediction will be a marginal inference problem, which is a typical application of HMM.

As we continue refining and improving our model, our focus remains steadfast on providing accurate and reliable short-term price forecasts for the SPY ETF, thereby contributing positively to the investment decisions of day traders.